



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **Ikuo TAKAHASHI et al.**

Group Art Unit: 1711

Application Number: 10/698,934

Examiner: **Nathan M. Nutter**

Filed: **November 3, 2003**

Confirmation Number: 5043

For: **AN ALIPHATIC POLYESTER COMPOSITION, A MOLDED ARTICLE THEREOF AND A METHOD FOR CONTROLLING BIODEGRADATION RATE USING THE SAME COMPOSITION**

Attorney Docket Number: 032044

Customer Number: 38834

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

October 5, 2006

Sir:

I, Hirotaka Iida, a citizen of Japan, hereby declare and state the following:

1. I graduated from Nagoya Institute of Technology of Nagoya, Aich, Japan in 1987 with a Bachelor of Science in Engineering Technology in Polymer Engineering.

2. Since 1987, I have been employed by Nisshinbo Industries, Inc., 2-31-11, Ningyo-cho, Nihonbashi, Chuo-ku, Tokyo, Japan where my present title is Research and Development. During my employment therein, I have conducted research and development on modifiers of polyester resins.

3. I have read and am familiar with the above-identified patent application as well as the Official Action dated June 8, 2006, in the application.

4. I have read and am familiar with the contents of cited references, U. S. Patent Nos. 5,616,657 to Imamura; 6,803,443 to Ariga et al.; 6,559,266 to Kaufhold et al.; 6,527,995 to Kaufhold et al.; and 5,900,439 to Prissok et al. cited in the Official Actions in the above-identified application.

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5. Under my supervision and control, I conducted experiments to obtain data to show that a carbodiimide compound and a benzotriazole-based compound do not exhibit a synergistic effect when they are used together with a polyurethane resin.

6. The following explains the experiment and data.

Sample 1: Pellets of ET690-10 (ester-type thermoplastic polyurethane manufactured and sold by BASF) were used as Sample 1.

Sample 2: Pellets of ET690-A10 (ester-type thermoplastic polyurethane manufactured and sold by BASF) were used as Sample 2.

Sample 3: An ether-type thermoplastic polyurethane was prepared by the following method and used as Sample 3:

A reaction vessel was charged with 58.3 parts by weight of a polytetramethyleneether glycol (PTMG) having a molecular weight of 2000 (as a polyol) and 33.0 parts by weight of 4,4'-diphenylmethane diisocyanate (MDI) (as an organic diisocyanate) and a polymerization reaction was conducted at 130°C under nitrogen atmosphere for 60 minutes to thereby obtain a polymer.

8.7 parts by weight of 1,4-butanediol (as a chain extender) was added to the prepolymer and a reaction was conducted for 15 minutes under the same conditions as above to thereby obtain a thermoplastic polyurethane having an NCO index of 1.05. The obtained polymer was pulverized to thereby obtain this polymer in the form of flakes.

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To the thermoplastic polyurethanes of Samples 1-3, "CARBODILITE HMV-8CA®" (as a carbodiimide compound) and "TINUVIN T234®" (as a benzotriazole compound) were dry blended in the ratios shown in the following Table A, followed by mixing in a twin screw extruder to prepare a film with a thickness of 200 µm through T-die. Each film was punched by a JIS No. 4 dumbbell to prepare the test piece, which was evaluated for its resistance to hydrolysis.

Each test sample piece was left in an air conditioned chamber maintained at 80°C and 90% RH for 170 hours, and ratios (%) of tensile strength and elongation after the test to the values before the test were calculated. Hydrolysis resistance was ranked as "good" for the sample with high ratios (%) of tensile strength and elongation. Table A gives the compositions and evaluation results.

Table A

	Experiment 1	Experiment 2	Experiment 3	Experiment 4
Sample 1	49.5	49	-	-
Sample 2	-	-	99	98
Sample 3	49.5	49	-	-
HMV-8CA	1	1	1	1
T234	-	1	-	1
Hydrolysis resistance strength ratio (%)	78.5	74.8	77.3	75.0

As shown in Table A above, comparison of Experiments 1 and 3 (each in which only a carbodiimide compound is used) with Experiments 2 and 4 (each in which only a carbodiimide compound is used in combination with a benzotriazole compound UV absorber) clearly shows that the combination use of a carbodiimide compound and a benzotriazole compound provides substantially no change in the hydrolysis resistance (strength ratio) of the film. That is, a

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carbodiimide compound and a benzotriazole-based compound do not exhibit a synergistic effect when they are used in a composition containing a polyurethane resin.

It is noted that each of Experiments 1 and 3 show relatively high hydrolysis resistance. This is because the hydrolysis resistance of a polyurethane resin itself is high, relative to that of a poly(lactic acid) or PBS used in the specification.

7. From the attached experimental results, I have concluded, among other things, that a carbodiimide compound and a benzotriazole-based compound do not exhibit a synergistic effect when they are used together with a polyurethane resin.

The undersigned declares that all statements made herein of his own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that wilful false statements may jeopardize the validity of the application or any patent issued thereon.

Hirotsuka Sida
Hirotsuka Sida

Signed this 5th day of October, 2006.